

National Ambient Air Quality Standards

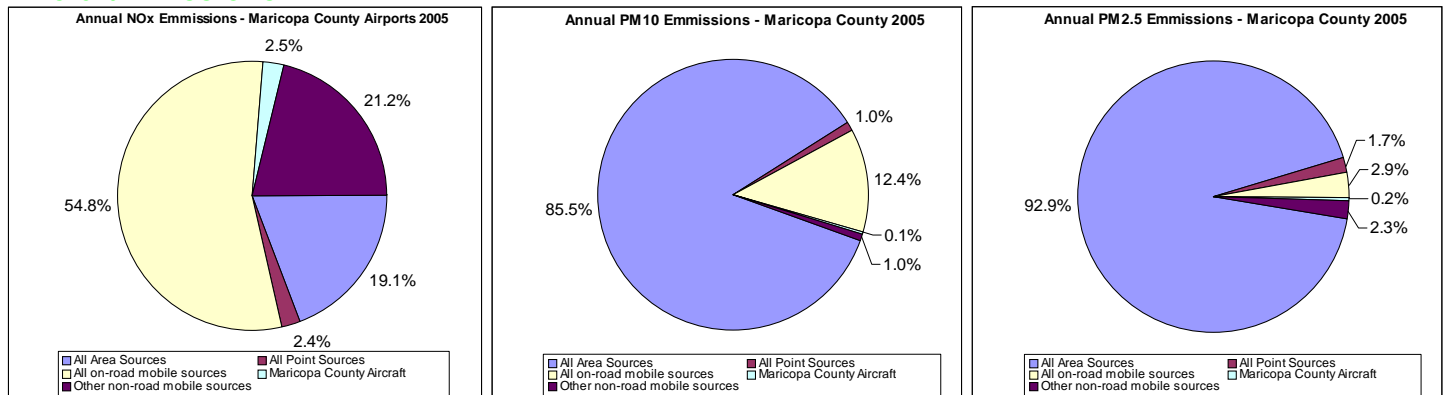
Air Quality in vicinity of larger airports has become an area of increased focus since most areas where large airports are located are in non-attainment or at the attainment limit for one or more of the National Ambient Air Quality Standards (NAAQS). Maricopa County is within an area in central Arizona designated by the EPA as being in serious non-attainment with the PM₁₀ standard, and in basic non-attainment with the 8-hour ozone standard¹. Ozone formation is driven by two emitted precursors, nitrogen oxides (NO_x) and volatile organic compounds (VOC). Ground level ozone build up occurs when VOC and carbon oxides (CO) react with hydrogen (OH) radicals on warmer days. High ozone concentrations are normally experienced on days with temperatures at or above 86F. In this context further examination of these pollutants and particle concentrations in the Maricopa County has been attempted to determine contributions from aircraft operations.

Aircraft Emissions Modeling

Emissions from aircraft operations relevant to NAAQS are calculated using a modeling tool that take into account aircraft/ engine types, landing and take-off operation (LTO) cycles and emissions from Ground Support Equipment (GSE)². The model accounts for dispersion of aircraft emissions up to 3,000 feet above ground level. The assumption is that aircraft emissions up to this height settles down and end up as contributions to ambient emission concentrations at ground level.



Aircraft Emissions



In 2007 Maricopa County released the 2005 periodic emission inventory for the PM₁₀ non attainment area. Calculated particulate matter contributions from aircraft operating at towered airports in the County were relatively small. More significant were the NO_x contributions from aircraft operations that in the 2005 inventory amounted to 2.5 % of the total tons of NO_x emissions per year estimated for the County as a whole.

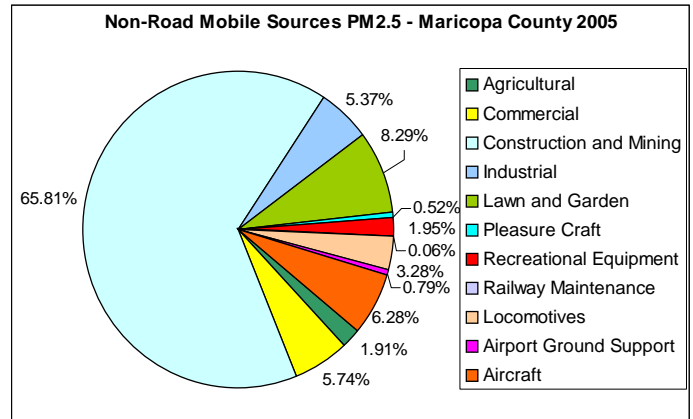
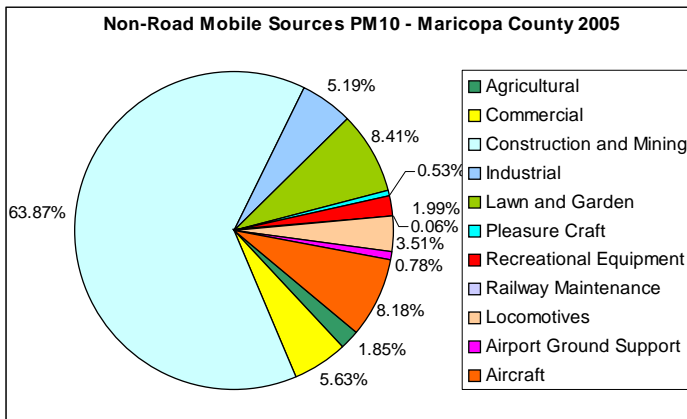
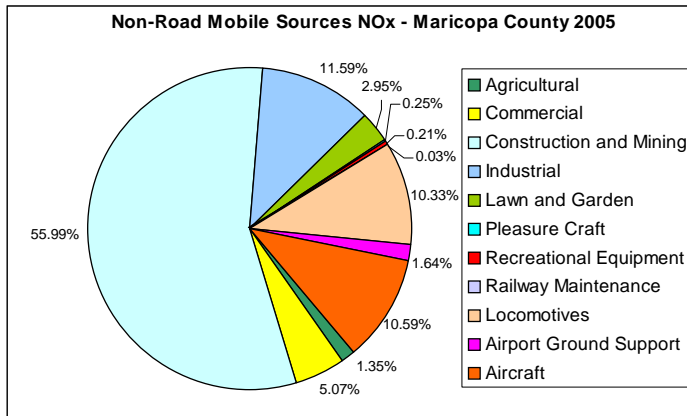
¹ EPA Region 9 Designation Maps for particulate matter (PM-10) and 8-hour standard for ground level ozone attainment.

http://www.epa.gov/region09/air/maps/maps_top.html. EPA re-designated the Phoenix area in attainment with CO standard in 2005.

² FAA Emission and Dispersion Modeling System (EDMS)

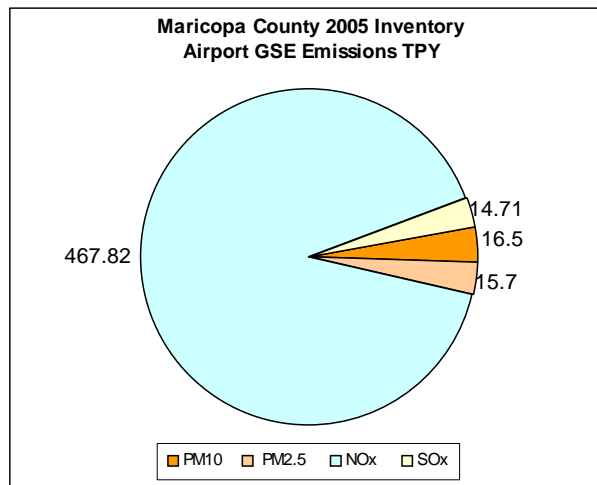
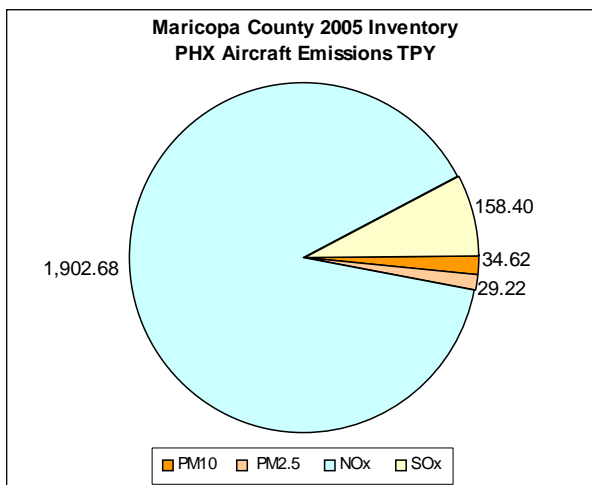
Aircraft and other Non-road Mobile Emission Sources

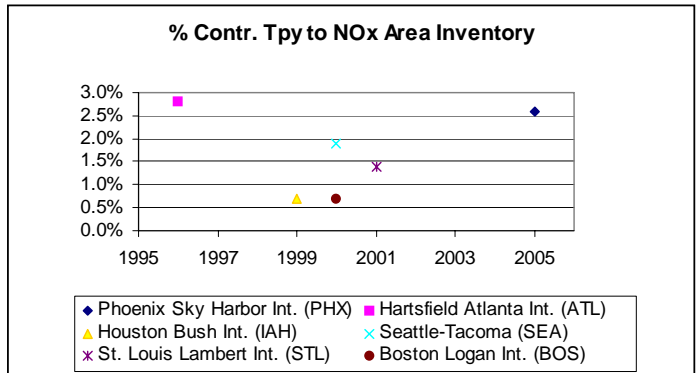
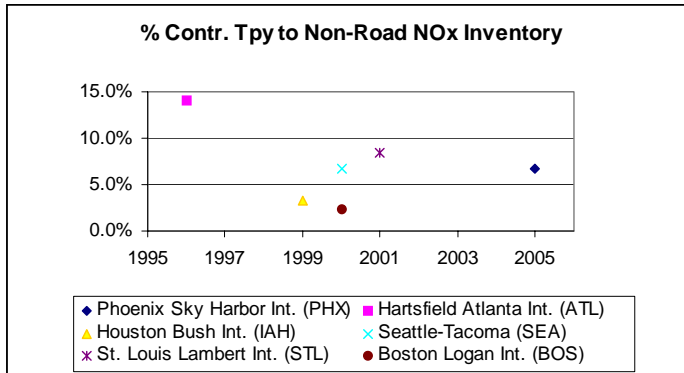
Among non-road mobile sources for NO_x and particulate matter emissions, aircraft and GSE combined amounted to 12.23% of the NO_x emitted per year from non-road mobile sources in Maricopa County. Only non-road mobile sources in construction and mining contributed more to the non-road mobile source inventory for NO_x emissions. However, compared to all the other NO_x emissions sources in Maricopa County, aircraft and GSE were not large NO_x contributors to the 2005 emission inventory.



Aircraft and GSE Emissions for Phoenix Sky Harbor International Airport

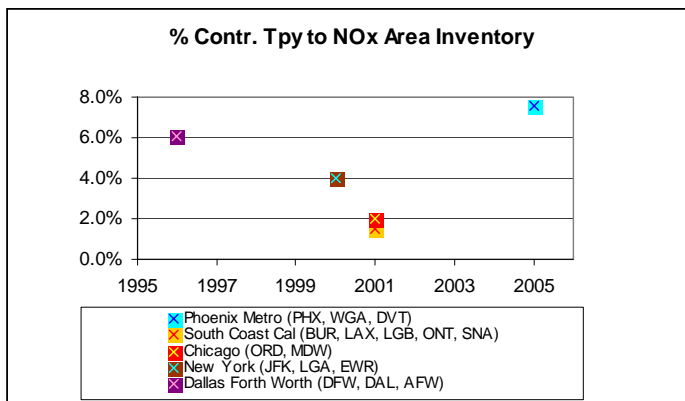
Emissions from the burning of fossil fuels are the main factor looking at contributions in tons per year from aircraft operations in the 2005 inventory for Maricopa County. Emissions from Ground Support Equipment at towered airports in Maricopa County were predominantly coming from Phoenix Sky Harbor International Airport, which were calculated to 86% for CO, 89% for both NO_x and SO₂, and 92% for both PM₁₀ and PM_{2.5} of total GSE emissions.





Above the NO_x contributions from selected U.S. airports to local emission inventories for 1996, 1999, 2000 and 2001 are compared with calculated NO_x contributions from aircraft operations and GSE at the Phoenix Sky Harbor International Airport listed in the Maricopa County 2005 inventory. Except for the Seattle-Tacoma International Airport all airports are located in non-attainment areas for NO_x under the EPA's 8-hour ground level ozone designation standard³. The NO_x contributions from individual airports to local area inventories constitute a small percentage of total NO_x emissions in all inventories. Combining NO_x contributions from

the larger airports within ground level ozone non-attainment areas, the relative size of airport contributions to area emission inventories can be estimated. Airports located in densely populated areas with NO_x contributions from a variety of sources, appear to collectively contribute a smaller percentage of total area NO_x emissions per year, than airports located in rural settings or less urbanized areas with with lower congestion and tons per year NO_x emitted to the air.



Airports and National Ambient Air Quality Standards

The "Airport Improvement Program" administered by the FAA helps airports finance larger development projects. Before requested federal funding assistance can be allocated to a proposed airport development project, an assessment of conformity with NAAQS needs to be completed⁴. In 2006 the FAA presented an Environmental Impact Statement for planned developments at Phoenix Sky Harbor International Airport. The statement predicted somewhat higher emission levels by 2015 compared to 2001 with the expected growth in aircraft operations, but if planned projects were implemented airport emission reductions per year were estimated to 3 tons PM₁₀, 3 tons PM_{2.5}, 216 tons CO, and 42 tons NO_x⁵.

³ The comparison of airport NO_x emission contributions to local 1996 – 2001 inventories are based on percent contributions compiled by Dr. Volker A. Mohnen, Baylor Institute for Air Science (BIAS). The sources for airport NO_x contributions include aircraft operations, use of GSE and vehicle operations at the airports.

⁴ National Environmental Policy Act (NEPA), FAA Orders 1050.1E, "Environmental Impacts: Policies and Procedures" and 5050.4B, "Airport Environmental Handbook".

⁵ Final Environmental Impact Statement for Phoenix Sky Harbor International Airport ADP (Airport Development Program), February 2006.